

(19) Japanese Bureau of Patents (JP) (12) Public Patent Report (A) (11) Publication NO.:
TokuKaiHei10-103215
(43) Publication date of application: April 21, 1998

(51) Int.Cl. ⁵ :	Discrimination NO.	F1	
1/03B 13/14		F03B 13/14	
H02N 2/00		H02N 2/00	A

Examination request: Unrequested
Number of inventions: 2 OL (total of 4 pages)

(21) Application No. : TokuKaiHei8-251556	(71) Applicant: 000006231 MURATA MFG CO., LTD. 2-26-10 Tenjin, Nagaokakyo-City, Kyoto-Fu
(22) Application date: September 24, 1996	(72) Inventor: Takeshi MAKAMURA 2-26-10 Tenjin, Nagaokakyo-City, MURATA MFG CO., LTD.

(54) [Name of invention] Wave Motion Generator

(57) [Summary]

[Assignment] To develop a wave motion generator which is small and easy to maintain.

[Solutions] Wave Motion Generator 10 comprises a circular Wave Receiving Base Plate 1, a cylindrical Piezoelectric Element 2 positioned approximately in the center of the other main face of Wave Receiving Plate 1, Mounting Plate 3 which fastens and holds Piezoelectric Element 2 with Wave Receiving Plate 1 and an Enclosure Member 4 which covers the periphery of the side face of Piezoelectric Element 2 which is spaced apart from the side face, and Wave Motion Generator 10 which is fixed by adhering Mounting Plate 9 to Fixing Base 5.

[Scope of claim]

[Claim 1] The wave motion generator transfers kinetic energy of waves to electric energy. It consists of a wave receiving base plate, which receives waves on the principal plane, and a piezoelectric element, which is positioned on the other principal plane of the above-mentioned wave receiving base plate. It changes the displacement that occurs when the above-mentioned wave receiving base plate receives waves, to electric signals.

[Claim 2] The wave motion generator in Claim 1 has the above-mentioned wave receiving base plate which is a plane at the contact surface with the above-mentioned piezoelectric element. It is also characterized by a spherical concave on the principal plane.

[Detailed description of the invention]

[0001]

[Field of the invention]

This invention relates to a wave motion generator.

[0002]

[State of technology prior to the invention]

In conventional technology, the following are common:

- i) A generator that generates power by rotating, for example, waterwheels or propellers.
- ii) A generator that generates by rotation using vertical movement of floating objects in the vertical movement of waves.

[0003]

[Problems the invention tries to solve]

However, the above-mentioned conventional generators both convert rotation to electric energy. That means they need a rotating machine and, furthermore, a converter to convert rotation to electric energy, resulting in the need for a large size device.

[0004]

The surface of the waterwheels and propellers need to be cleaned regularly because dirt on the waterwheel and propellers reduce the pressure from waves. In addition, they are usually complex in shape.

[0005]

Furthermore, rotation of the rotating machine should be smooth, resulting in the need for maintenance of the axis, which is one of the reasons for the high cost.

[0006]

The purpose of this invention is to resolve the problems mentioned above and to provide a wave motion generator that is small and easy to maintain.

[0007]

[Means to solve the problems]

In order to meet the above-mentioned purposes, this invention is a wave motion generator that converts kinetic energy of waves to electric energy. It consists of a wave receiving base plate, which receives waves on the principal plane, and a piezoelectric element, which is positioned on the other principal plane of the above-mentioned wave receiving base plate. It changes the displacement that occurs when the above-mentioned wave receiving base plate receives waves, to electric signals.

[0008]

The wave receiving base plate is characterized by a plane at the contact surface with the piezoelectric element and also by a spherical concave on the principal plane.

[0009]

Therefore, since the wave motion generator is composed of only one wave receiving base plate and a piezoelectric element, and furthermore, since the piezoelectric element itself converts displacement to electric energy, it is possible to reduce the entire size of the body of the device.

[0010]

In addition, installation of a concave on the principal plane of the wave receiving base plate reduces the escape of waves and improves the efficiency of conversion of wave pressure to electric energy. It also enables sufficient wave pressure to be obtained even if the direction of wave pressure is not perpendicular to the plane of the wave receiving base plate. The conversion efficiency to electric energy can be stabilized.

[0011]

Furthermore, maintenance, such as cleaning, is easy because the wave receiving base plate is a plane or continuous concaves.

[0012]

[Embodiments of the invention]

Next, the display by an embodiment of this invention is explained with reference to drawings. Figure 1 and 2

show Wave Motion Generator 10 as the first embodiment of this invention. Wave Motion Generator 10 is composed of spherical Wave Receiving Base Plate 1, spherical Piezoelectric Element 2 installed approximately in the center of the other principal plane of Wave Receiving Base Plate 1, Mounting Plate 3 for holding tight Piezoelectric Element 2 and Wave Receiving Base Plate 1, and Enclosure Member 4 which covers the periphery of the side face of Piezoelectric Element 2 which is spaced apart from the side face. Wave Motion Generator 10 is fixed by adhering Mounting Plate 3 on Fixing Base 5.

[0013]

Cylindrical Piezoelectric Element 2 forms Electrode 2a and 2b on the upper and lower side respectively, polarized from the top to the bottom or in reverse direction.

[0014]

When the principal plane of Wave Receiving Base Plate 1 receives wave pressure, Wave Receiving Base Plate 1 is displaced. This displacement of Wave Receiving Base Plate 1 is transferred to Piezoelectric Element 2, where electric energy occurs. Wave Motion Generator 10 functions as a generator by extracting this electric energy from Electrode 2a and 2b through a lead wire, for example, (not illustrated).

[0015]

Next, Figure 3 shows Wave Motion Generator 20 as the second embodiment of this invention. Wave Motion Generator 20 is composed of spherical Wave Receiving Base Plate 21, spherical Piezoelectric Element 22 installed approximately in the center of the other principal plane of Wave Receiving Base Plate 21, Mounting Plate 23 for holding tight Piezoelectric Element 22 and Wave Receiving Base Plate 21, and Enclosure Member 24 which covers the periphery of the side face of Piezoelectric Element 22 which is spaced apart from the side face. Wave Motion Generator 20 is fixed by adhering Mounting Plate 23 on Fixing Base 25.

[0016]

Wave Receiving Base Plate 21 is a plane at the contact surface with Piezoelectric Element 22, and is structured as a concave on the principal plane of Wave Receiving Base Plate 21.

[0017]

Cylindrical Piezoelectric Element 22 forms Electrode 22a and 22b on the upper and lower side respectively, polarized from the top to the bottom or in reverse direction.

[0018]

When the principal plane of Wave Receiving Base Plate 21 receives wave pressure, Wave Receiving Base Plate 21 is displaced. This displacement of Wave Receiving Base Plate 21 is transferred to Piezoelectric Element 22, where electric energy occurs. Wave Motion Generator 20 functions as a generator by extracting this electric energy from Electrode 22a and 22b through a lead wire, for example, (not illustrated).

[0019]

The structure of wave motion generators shown in the embodiments mentioned above is simple as shown in the figures, and the whole body of the device can be reduced in size because the piezoelectric element itself converts displacement into electric energy.

[0020]

Maintenance, such as cleaning, is easy because the part that receives waves is a plane or one-way concave.

[0021]

In addition, in the second embodiment, installation of a concave on the principal plane of the wave receiving base plate reduces the escape of waves and improves the efficiency of conversion of wave pressure to electric energy. It also enables sufficient wave pressure to be obtained even if the direction of wave pressure is not perpendicular to the plane of the wave receiving base plate. The conversion efficiency to electric energy can also be stabilized.

[0022]

In the wave motion generators mentioned in the above embodiments, Wave Receiving Base Plate 1 is round shaped, but other polygons will do, too. Its shape is not specifically restricted. The material is also not specified. However, materials where the wave receiving base plate itself does not absorb any displacement, for example, a stainless steel board etc., is preferable.

[0023]

Also, the shape of the piezoelectric element is not restricted to a round column but any multiple pillar forms, for example, a square pillar shape is sufficient. The piezoelectric element can be a multi-layer structure depending on the purpose or usage.

[0024]

The mounting plate and the fixing base are separately formed, but they can be combined, meaning the fixing base can be used as a mounting plate.

[0025]

It is recommended that material that can improve the waterproof property inside the wave motion generator, such as silicon ring or silicon resin, be used as a sealant.

[0026]

Wave Motion Generator 20 shown in the second embodiment has Wave Receiving Base Plate 21 with a concave, but it is also possible to make the whole part of Wave Receiving Base Plate a concave by separately setting a convexly curved material on the principal plane of Wave Receiving Base Plate 1 as shown in the first embodiment.

[0027]

When a large amount of power is needed, multiple wave motion generators of this invention can be placed connected to each other on the fixing base just like a tile veneer.

[0028]

[Effects of the invention]

Since the wave motion generator in this invention is thus composed of one sheet of wave receiving base plate and a piezoelectric element, and also since the piezoelectric element itself converts displacement into electric energy, the whole body of the device can be reduced in size.

[0029]

In addition, installation of a concave on the principal plane of the wave receiving base plate reduces the escape of waves and improves the efficiency of conversion of wave pressure to electric energy. It also enables sufficient wave pressure to be obtained even if the direction of wave pressure is not perpendicular to the plane of the wave receiving base plate. The conversion efficiency to electric energy can be stabilized.

[0030]

Furthermore, maintenance, such as cleaning, is easy because the wave receiving base plate is a plane or continuous concaves.

[Brief explanation of the drawings]

[Figure 1]

A plan view showing the structure of the wave motion generator by the first embodiment of this invention.

[Figure 2]

A cross sectional drawing of A-A line in Figure 1

[Figure 3]

A plan view showing the structure of the wave motion generator by the second embodiment of this invention

[Explanation of marks]

- 1, 21 Wave Receiving Base Plate
- 2, 22 Piezoelectric Element

10, 20 Wave Motion Generator

Figure 1

Figure 2

Figure 3